

8.3.1 Even-Interval Water Quality

In order to evaluate overall dissolved oxygen levels in the watershed, NMP Project staff evaluated percent saturation data. This parameter provides information as to whether super saturated conditions are present. Super-saturation can occur when excessive amounts of algae produces an abundance of oxygen in the water. Often, these high percentages are indicative of large diurnal fluctuations, with low levels occurring pre-dawn. These conditions can be harmful to fish. Because pre-dawn monitoring was not a part of the NMP project, staff conducted an analysis of percent saturation data in order to evaluate trends.

Of data collected between 1993-2001, percent saturation exceeded values indicative of supersaturated conditions (>110 %) at numerous sites. These elevated values suggest that algal blooms (observed at some NMP monitoring sites) may be contributing towards water quality degradation. Algal blooms are often caused by excessive nutrients (discussed below).

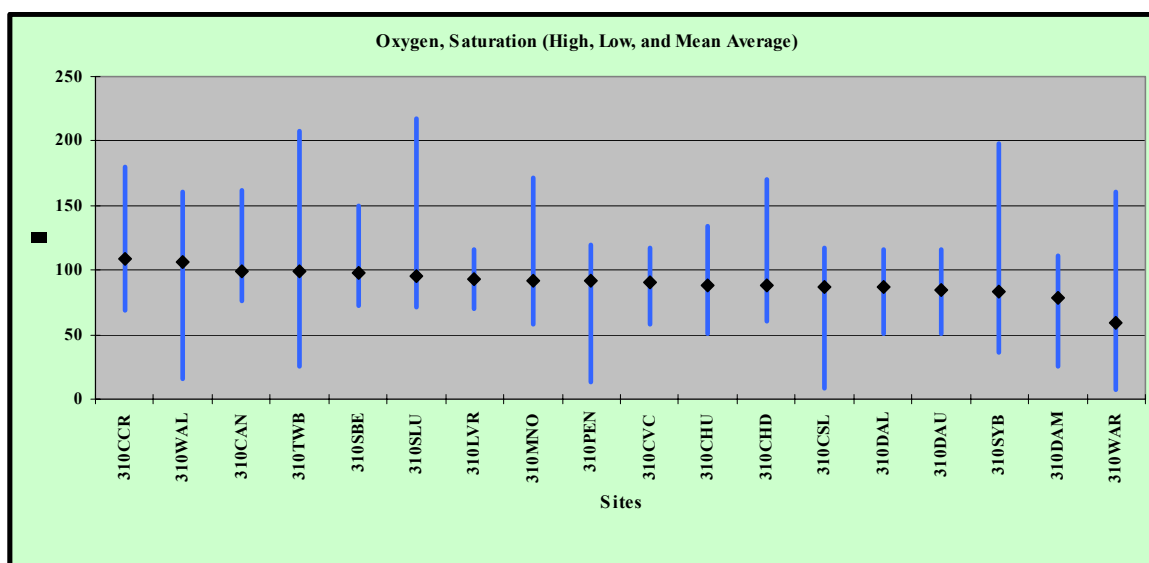


Figure 8.2. Percent saturation found at NMP sites between 1993 and 2001.

NMP Project staff evaluated nutrient concentrations using NMP data collected between 1993-2001. Table 8.3 and Table 8.4 show average nitrate (NO_3^- -N) and phosphate (PO_4^{3-} -P) concentrations within the Chorro Creek and Los Osos Creek watersheds.

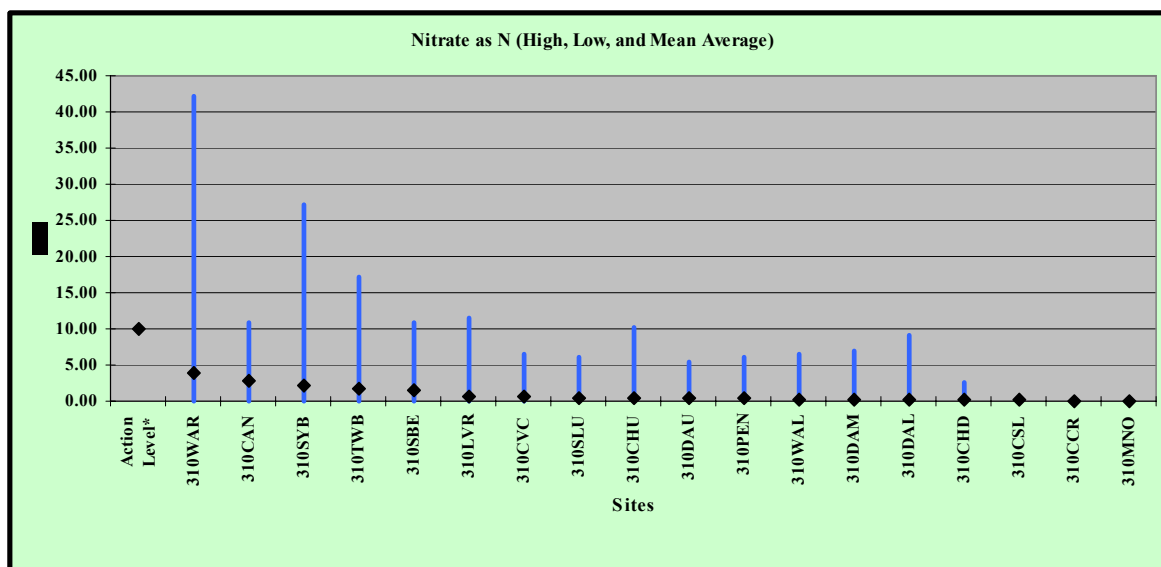


Figure 8.3 Average nitrate (NO_3^- as N) at National Monitoring Program sites 1993-2001. Attention 2* level shows Central Coast Ambient Monitoring Program and Total Maximum Daily Load target levels of 2.25 mg/L

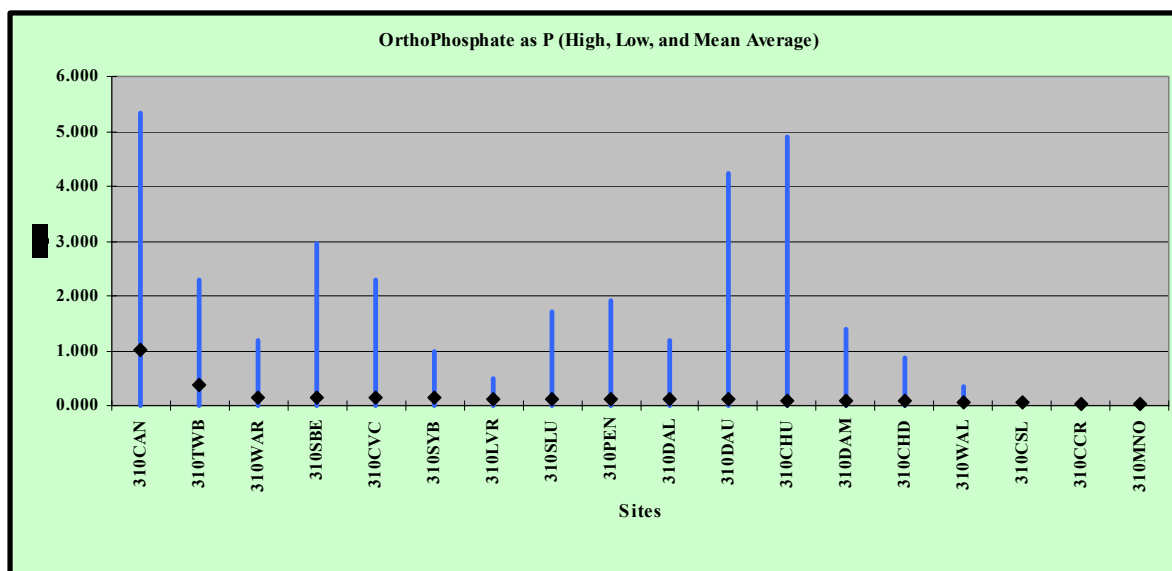


Figure 8.4 Average ortho-phosphate (PO_4^- as P) at National Monitoring Program sites 1993-2001. Attention 2* level shows Central Coast Ambient Monitoring Program and Total Maximum Daily Load target levels of 0.12 mg/L

The California Men's Colony (CMC) Wastewater Treatment Plant discharges upstream of the CAN site. The WWTP currently is upgrading the plant to reduce nitrate in the effluent. Future actions may be recommended to include phosphate removal. As shown in Figure 8.1, the majority of the watershed draining to TUR and WAR are in crop production. Efforts are underway to encourage self-determined implementation of BMPs on cropland in an effort to reduce nutrients.

Regional Board staff evaluated fecal coliform concentrations collected between 1993 and 2001. Figure 8.5 shows the geometric mean, along with the range of fecal coliform concentrations found at NMP sites throughout the Chorro Creek and Los Osos Creek watersheds. Elevated levels above the Regional Board's Basin Plan water quality objective for water contact recreation (400 MPN) have been found throughout the Morro Bay watershed. Data collected at the paired watersheds and at the two cattle exclusions were evaluated as to the effectiveness of BMPs in reducing bacteria levels. The results are included in previous chapters in this report.

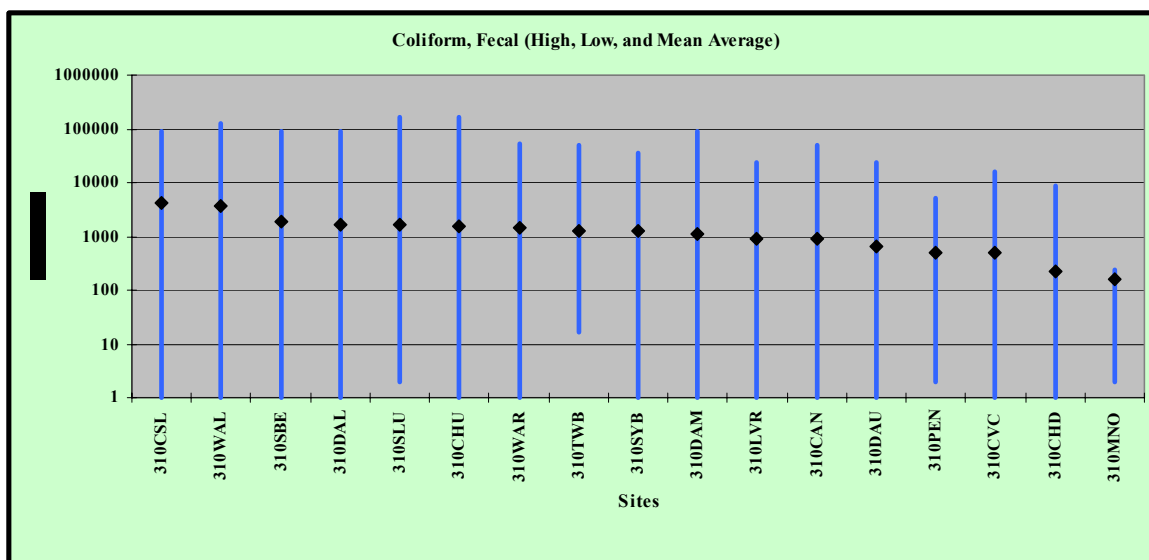


Figure 8.5 Fecal coliform bacteria concentrations throughout the Chorro Creek and Los Osos Creek watersheds.

Regional Board staff evaluated turbidity concentrations collected between 1993 and 2001. Figure 8.6 shows levels found in the watershed. While elevated levels were found, particularly during the high winter flow periods following the Highway-41 Fire, mean concentrations were typically low throughout the watershed.

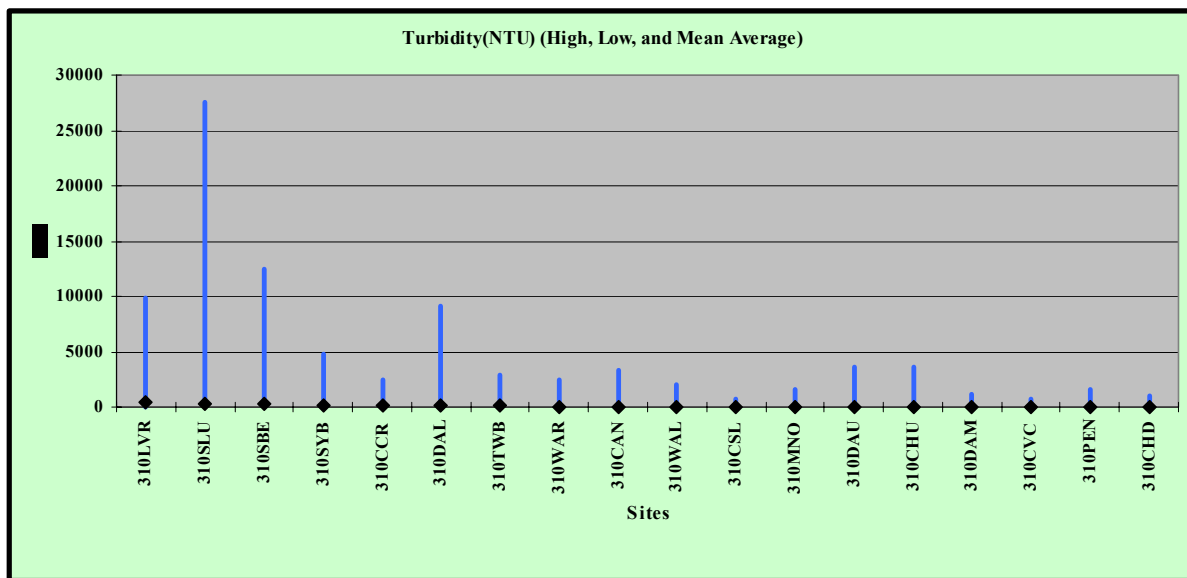


Figure 8.6. Turbidity concentrations throughout the Chorro Creek and Los Osos Creek watersheds.

8.3.2 Rapid Bioassessment

Regional Board staff conducted an analysis of Rapid Bioassessment data collected between 1993 and 2001 throughout the watershed. An Index of Biological Integrity was used to evaluate benthic invertebrate communities. The results are shown in Figure 8.7. As anticipated, the least disturbed sites received higher scores than the more impacted sites. For example, LVR and CLK, upstream sites on Los Osos Creek and PEN, a reference reach on Chorro Creek had scores greater than 7, while sites on Chorro Creek upstream from Chorro Flats had scores below 4. Data collected at the BMP evaluation sites were also evaluated as to their effectiveness. Time series analyses and results are included in previous chapters in this report.

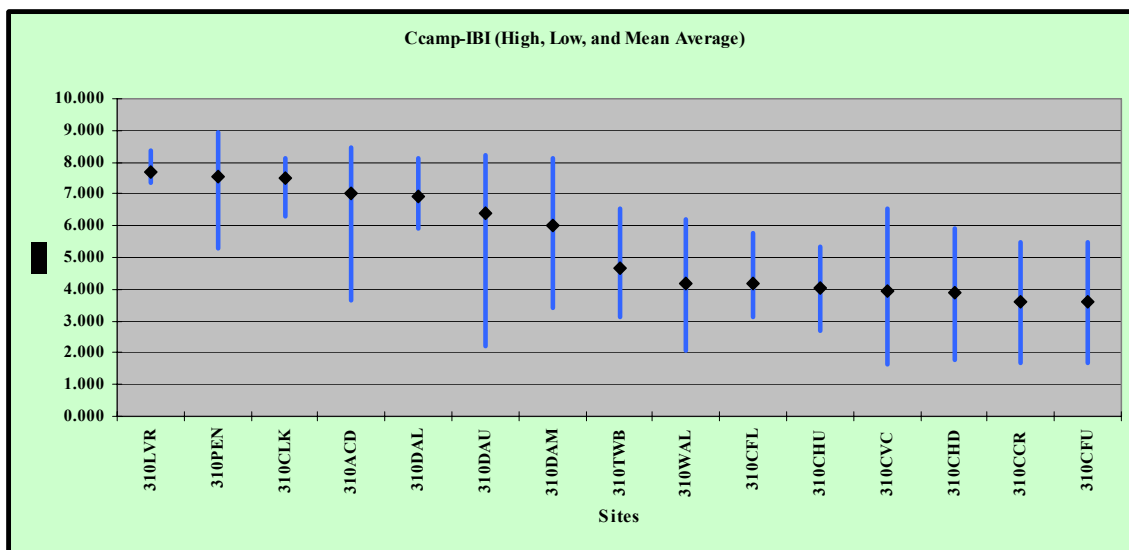


Figure 8.7. IBI scores found throughout the Morro Bay watershed.

8.3.3 Habitat Quality

Regional Board staff conducted an analysis of data collected between 1993 and 1997 of surface particle sizes in Chorro Creek and in Dairy Creek and Pennington Creek subwatersheds. In Chorro Creek just downstream from the reservoir, the average dominant particle size found in five transects was 33.5 mm. Average surface particle sizes at Dairy Creek and Pennington Creek were 15.25 mm and 12.75 mm, respectively. Data collected during the 1994 sampling period was omitted from the analysis as the values were much lower than in other years, possibly resulting from the Highway 41 Fire.

Regional Board staff also performed particle size analysis on the lower reaches of Chorro Creek near Chorro Flats and the Chorro Delta in 1997. Average values from transects sampled were lower than those found at upstream sites in the watershed, with D50 values of 3.0 mm.

Regional Board staff performed a qualitative Habitat Assessment, which included an evaluation of bottom substrate and embeddedness using California Department of Fish and Games's Rapid Bioassessment protocols (1993, 1995, 1996). Results from 1993-1999 assessments show that average scores in the upper reaches of Chorro Creek, Clark Canyon branch of Los Osos Creek, and Dairy Creek were similar with "sub-optimal" bottom substrate scores between 10% and 20% fines and "sub-optimal" embeddedness scores, where gravel, cobble and boulder particles are between 25%-50% surrounded by fine sediment (particles less than 6.35 mm).

Regional Board staff also found that Pennington Creek had the highest scores, with "optimal" embeddedness, where gravel, cobble and boulder particles are between 0-25% surrounded by fine sediment. Average Pennington Creek bottom substrate scores were also between 10% and 20% fines.

Regional Board staff found that on the Warden branch of Los Osos Creek and at the lower reaches of Chorro Creek (near Chorro Flats) were "marginal", with average bottom substrate between 20% and 50% fines and embeddedness of gravel, cobble and boulder particles between 50%-75% surrounded by fine sediment.

8.4 Overall Conclusions

NMP Project staff evaluated data collected between 1993-2001 throughout the watershed. Elevated percent saturation, exceeding values indicative of supersaturated conditions were found at numerous sites. Additionally, elevated nitrate (NO_3^- -N) and phosphate (PO_4^- -P) concentrations were found throughout the watershed. Elevated fecal coliform concentrations were also found. Elevated turbidity levels were found, particularly during the high winter flow periods following the Highway-41 Fire. Mean concentrations, however, were typically low throughout the watershed. Index of Biological Integrity scores were evaluated throughout the watershed, and the least disturbed sites received higher scores than the more impacted sites.

The Friends of the Estuary's Volunteer Monitoring Program is continuing much of the watershed-wide water and habitat quality assessment as part of another 319 (h) grant with the assistance of the Morro Bay National Estuary Program. Implementation efforts are underway by numerous organizations in the watershed. These actions are expected to improve water and habitat quality conditions throughout the Morro Bay watershed.